New developments in TRIμP and RIASH at KVI

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An overview wil be given of new developments within the TRIμP programme and the RIASH project at the Kernfysisch Versneller Instituut (KVI). Emphasis will be placed on experimental possibilities and performance.

The TRIμP programme (Trapped Radioactive Isotopes: μicro-laboratories for Fundamental Physics) [1] searches for new physics not yet provided in the standard model of particle physics. It focuses on β-neutrino(recoil nucleus) correlations using sodium and neon isotopes and the search for a permanent electric dipole moment using radium isotopes. For this, a new experimental facility to trap radioactive atoms is coming on-line at KVI [2]. The high-energy radioactive ions selected by the fragment and recoil magnetic separator (operational since 2004 [3]) will first be converted to a low-energy beam using an ion catcher device (a hot cavity surface ionization ion source at first), then cooled and bunched in a radio-frequency quadrupole, and finally sent to the atom trap set-ups. A laser laboratory to develop new heavy alkali-earth atom trapping and spectroscopy has been set-up.

The RIASH (Radioactive Ions and Atoms in Superfluid Helium) project concentrates on developing techniques to use superfluid helium to stop high-energy radioactive ions and extract them as a cold ion beam. The recent successful proof-of-principle experiments [4] will be summarized and results of experiments performed in 2005 concentrating on the extraction of ions from superfluid helium will be discussed. We have also studied the survival and transport of energetic ions in cryogenic helium, neon and argon gas. The excellent efficiency below 100 K shows the large potential of cryogenic gas catcher devices. The measured efficiencies at low temperature are considered to represent a fundamental upper limit to the efficiency of such devices.

More details on the TRIμP programme and the RIASH project are presented in two poster contributions to this conference.

[1] www.kvi.nl/~trimp/web/html/trimp.html
[2] G.P. Berg *et al.*, Nucl. Instrum. Meth. Phys. Res. **B204**, 532 (2003)
[3] G.P.A. Berg *et al.*, Nucl. Phys. **A721**, 1107c (2003)
[4] W.X. Huang *et al.*, Europhys. Lett. **63**, 687 (2003)